



DEFINING MEDICAL LEVELS OF CARE FOR EXPLORATION MISSIONS

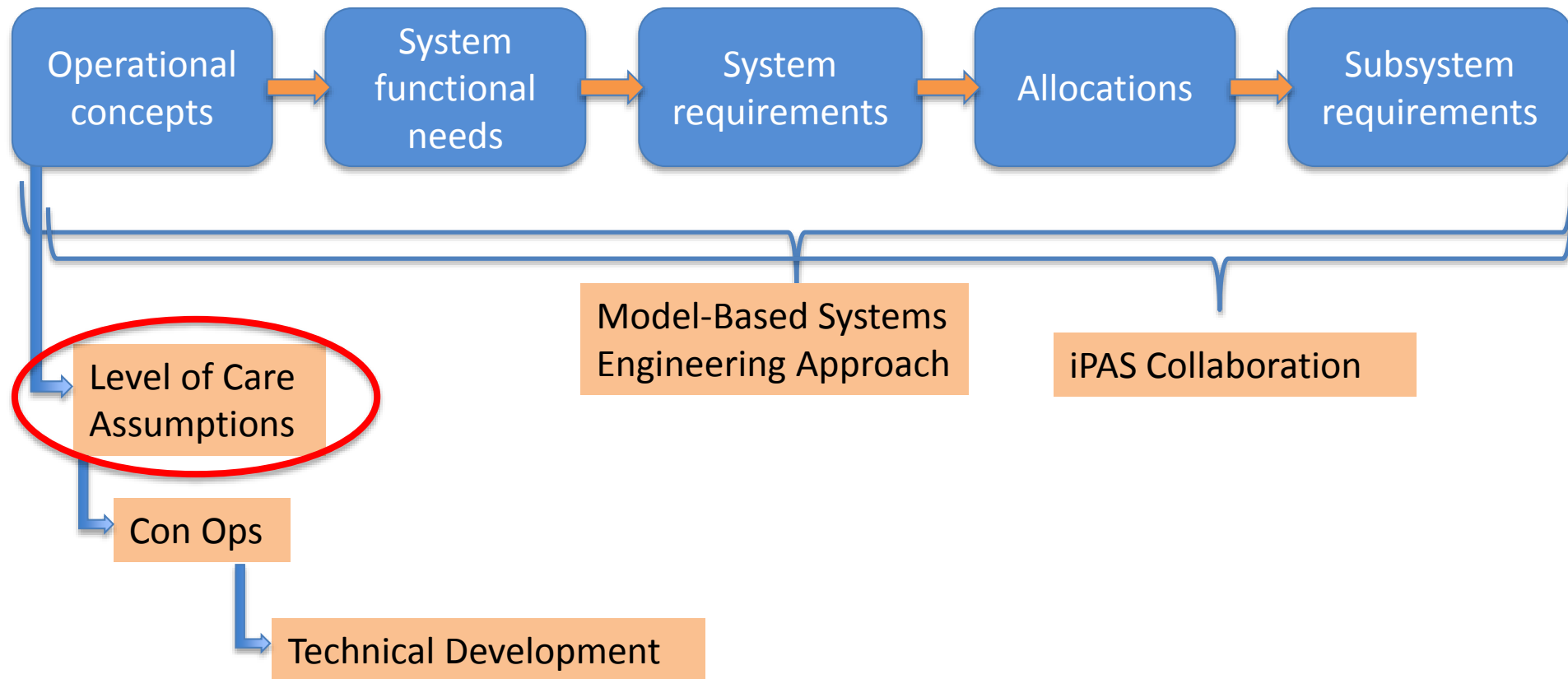
NASA Human Research Program
Investigators Workshop
January 2017

Melinda Hailey, RN
Clinical Coordinator - ExMC



Presented upon behalf of:
David Reyes MD, MPH
Michelle Urbina
David Rubin PMP
Erik Antonsen MD, PhD

Systems Engineering Session Talks



The needs identified by this work will drive future ExMC research

HUMAN EXPLORATION

NASA's Journey to Mars



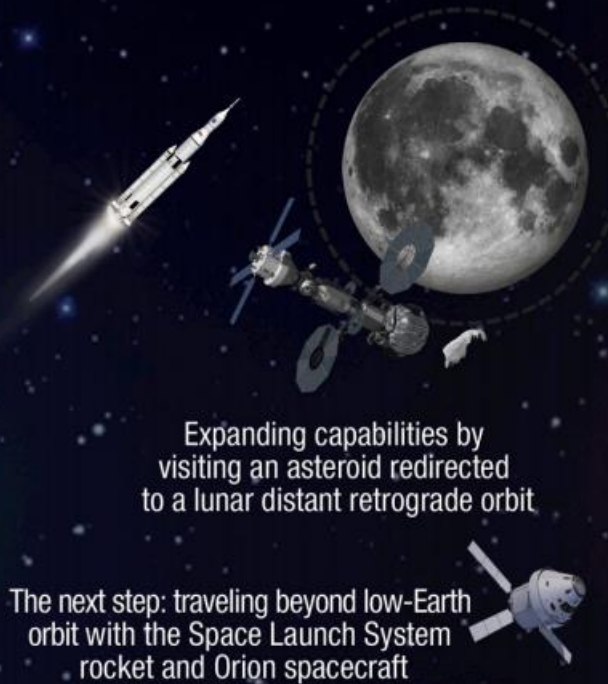
EARTH RELIANT

MISSION: 6 TO 12 MONTHS
RETURN TO EARTH: HOURS



PROVING GROUND

MISSION: 1 TO 12 MONTHS
RETURN TO EARTH: DAYS



EARTH INDEPENDENT

MISSION: 2 TO 3 YEARS
RETURN TO EARTH: MONTHS





NASA-STD-3001

Levels of Care



Level I LEO <8d	Space Motion Sickness	First Aid // Anaphylaxis Response	Basic Life Support	Private Audio
Level II LEO <30d	Clinical Diagnostics	Ambulatory Care	Private Video	Private Telemedicine
Level III Post LEO <30d		Limited Dental Care	Limited Advanced Life Support	Trauma Care
Level IV Lunar >30d	Medical Imaging	Dental Care	Sustainable Advanced Life Support	Limited Surgical Care
Level V Lunar/Planetary >210d		Autonomous Ambulatory Care	Autonomous Advanced Life Support	Basic Surgical Care



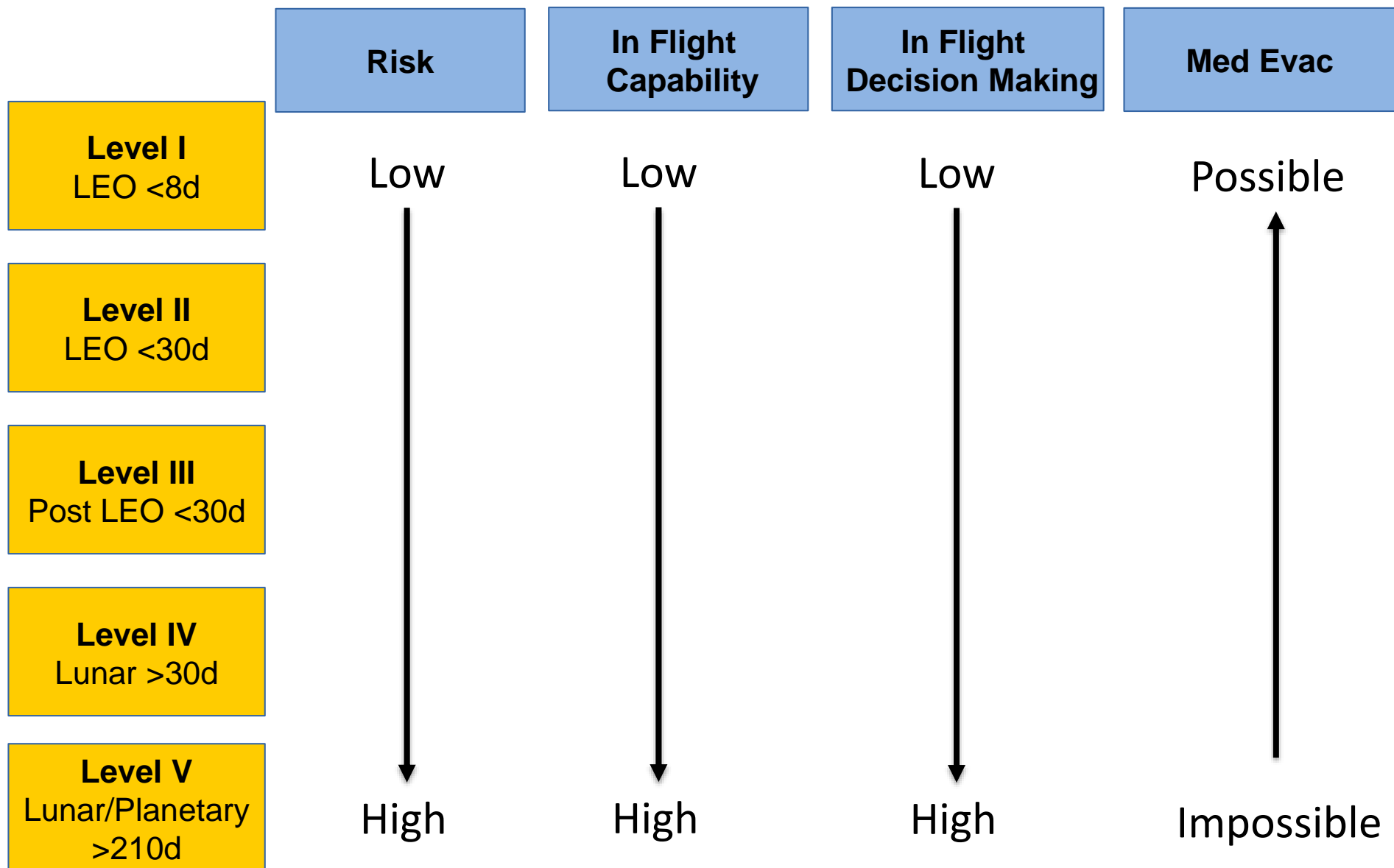
Level of Care Influencers



- Mission and Objectives
- Risk
- Duration
- Time to Definitive Care
- Health/Performance
- Medical Provider / Training
- Technology & Medical Advances



Level of Care Capabilities





LOC 1





LOC 2

Dr. Scott



https://commons.wikimedia.org/wiki/File:Tripler_Army_Medical_Center_tell_out_Nurse_Advice_Line_140508-F-AD344-003.jpg



https://upload.wikimedia.org/wikipedia/commons/e/ee/Vacutainer_blood_bottles.jpg



https://commons.wikimedia.org/wiki/File:Urine_sample.jpg



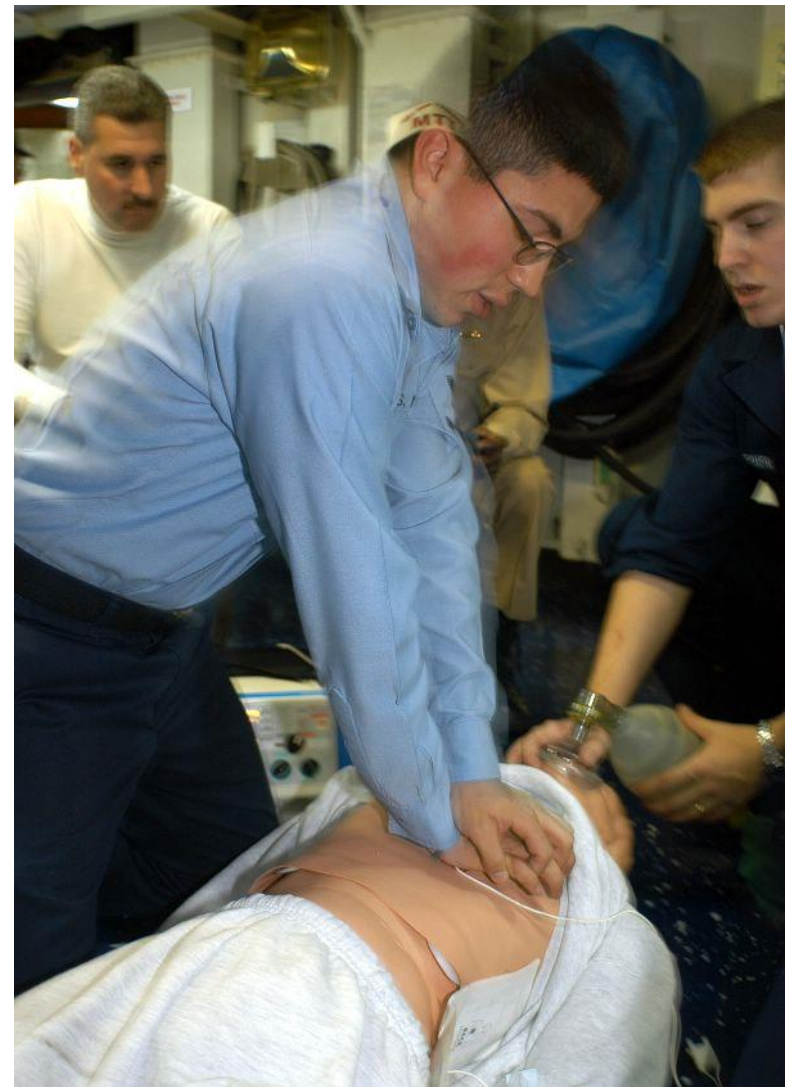
LOC 3



<http://www.jtfgtmo.southcom.mil/wire/wire/WirePDF/v11/Issue4v11.pdf>



https://commons.wikimedia.org/wiki/File:Cervical_Collar_Emergency.jpg



http://www.navy.mil/view_image.asp?id=13526



http://www.navy.mil/view_image.asp?id=706



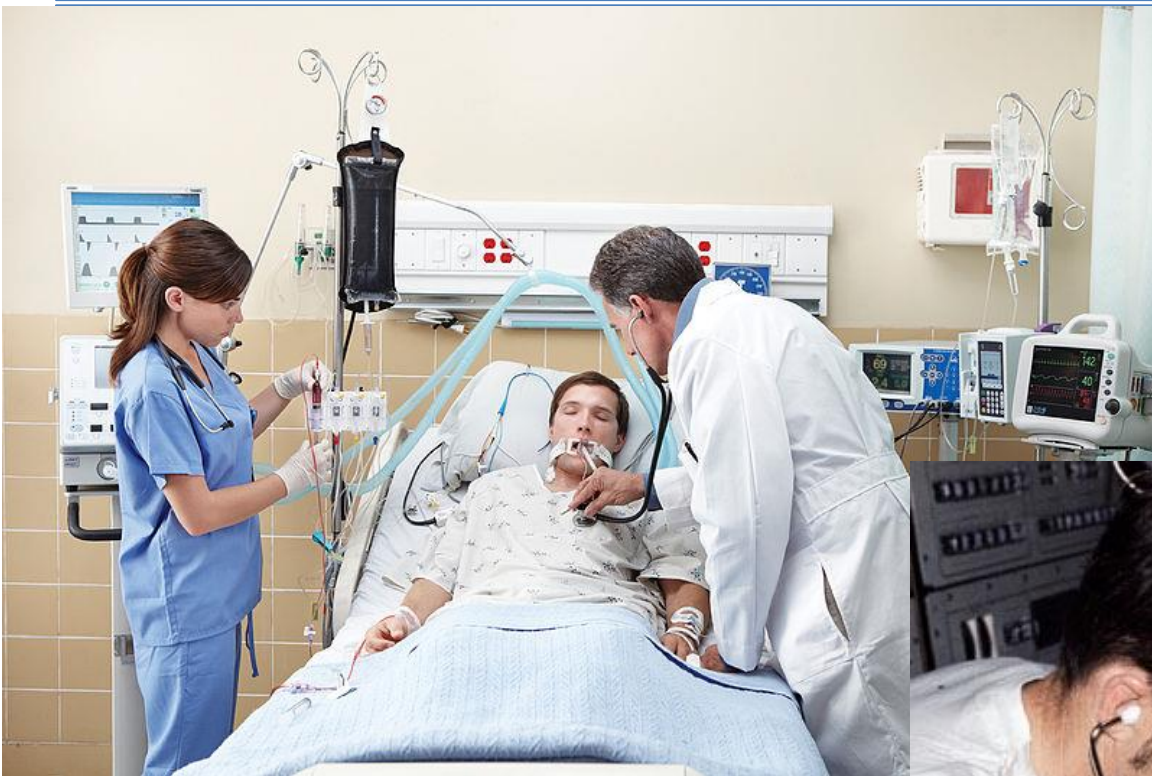
http://www.navy.mil/view_image.asp?id=26619



http://www.navy.mil/view_image.asp?id=36844



LOC 5



https://commons.wikimedia.org/wiki/File:Clinicians_in_Intensive_Care_Unit.jpg



https://www.nasa.gov/audience/formedia/presskits/ffs_gallery_hbp_image1.html



NASA-STD-3001

Levels of Care



Level I
LEO <8d

Space Motion
Sickness

First Aid //
Anaphylaxis
Response

Basic Life
Support

Private Audio

First Aid Definition: Provide basic management for common injuries

First Aid example actions:

- Control minor bleeding through direct pressure
- Clean wounds
- Splint extremities
- Dispense, administer and track over the counter medications for control of pain and prevention of infection



Level of Care Capabilities



Level I LEO <8d	Space Motion Sickness	First Aid // Anaphylaxis Response	Basic Life Support	Private Audio
Level II LEO <30d	Clinical Diagnostics	Ambulatory Care	Private Video	Private Telemedicine
Level III Post LEO <30d		Limited Dental Care	Limited Advanced Life Support	Trauma Care
Level IV Lunar >30d	Medical Imaging	Dental Care	Sustainable Advanced Life Support	Limited Surgical Care
Level V Lunar/Planetary >210d		Autonomous Ambulatory Care	Autonomous Advanced Life Support	Basic Surgical Care



Advanced Life Support Definition



3 Limited	Diagnosis and initial treatment for an emergent medical event.
4 Sustainable	Diagnosis and initial critical care treatment for an emergent medical event requiring ALS.
5 Autonomous	Diagnosis and critical care treatment for an emergent medical or traumatic event using medical information obtained from physical exam, clinical diagnostics and medical imaging. Rehabilitation and palliative care options will be provided.



Advanced Life Support Example Actions



3
Limited

Reposition airway, insert airway adjuncts *and supraglottic airways

4
Sustainable

Reposition airway, insert airway adjuncts, supraglottic *and endotracheal airways

5
Autonomous

Reposition airway, insert airway adjuncts, supraglottic, endotracheal, *and surgical airways

Levels I - III

EARTH RELIANT

MISSION: 6 TO 12 MONTHS
RETURN TO EARTH: HOURS



Level III and IV

PROVING GROUND

MISSION: 1 TO 12 MONTHS
RETURN TO EARTH: DAYS



Level V

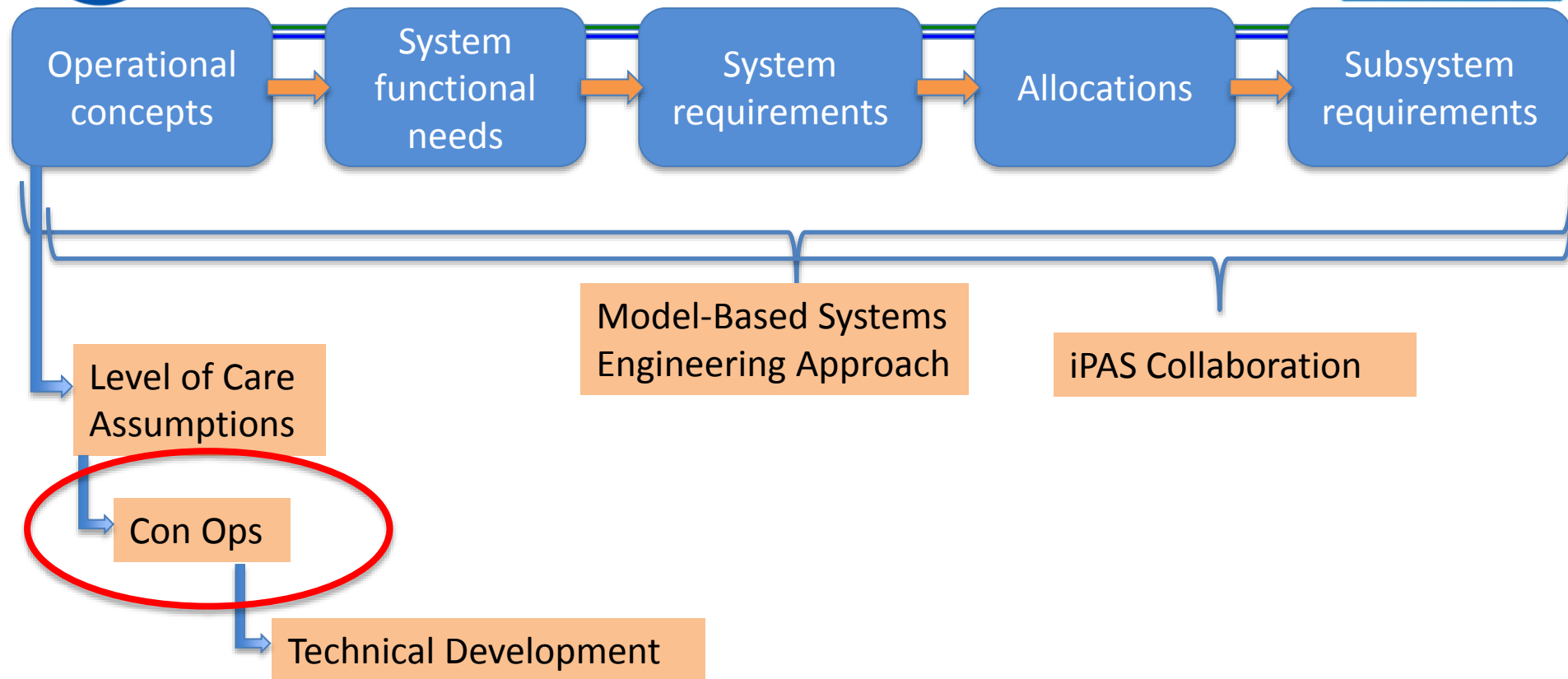
EARTH INDEPENDENT

MISSION: 2 TO 3 YEARS
RETURN TO EARTH: MONTHS





Systems Engineering Session Talk



The needs identified by this work will drive future ExMC research